

# **Permian CCS Center**

## **Carbon Capture & Storage Technology**

### ***CCS Training in the Permian Basin, A Regional Technology Transfer Training Program***

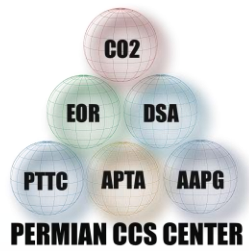
Regional Carbon Sequestration Partnerships  
Annual Review Meeting

Pittsburgh, PA October 5 – 7, 2010

Award DE-FGE0002060

DOE Contract Officer – Traci Rodosta

Lance Cole – Petroleum Technology Transfer  
Council



# Permian CCS Center

**Carbon Capture & Storage Technology**

## Presentation Topics

Organization

Milestones

Permian Basin CCS Approach

Elements of Program

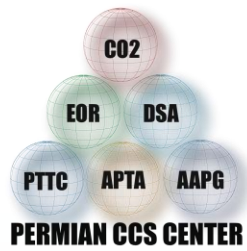
Website

Workshops

Newsletter and E-Alert

E-Cert and Extended Workshop

Going Forward



# Three World Class Organizations



## Petroleum Technology Transfer Council

Tech Transfer, Workshops, Newsletter, Tech Alerts

[www.pttc.org](http://www.pttc.org)



## American Association of Petroleum Geologists

37,000 Members, Publications and Conferences

Distance Learning [www.aapg.org](http://www.aapg.org)



## Applied Petroleum Technology Academy

CO<sub>2</sub> Course, CO<sub>2</sub> Conference [www.aptapb.org](http://www.aptapb.org)



# CARBON CAPTURE & STORAGE TECHNOLOGY

"World Class CCS Training for & by Industry Professionals"

*Imparting the needed skill sets to realize CCS opportunities*

Developed & Delivered by PTTC, APTA & AAPG with Grant Funding from the American Recovery and Reinvestment Act of 2009 through DOE

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Elements of the Program ▶

Calendar of CCS Events

Newsletter/Tech Alerts

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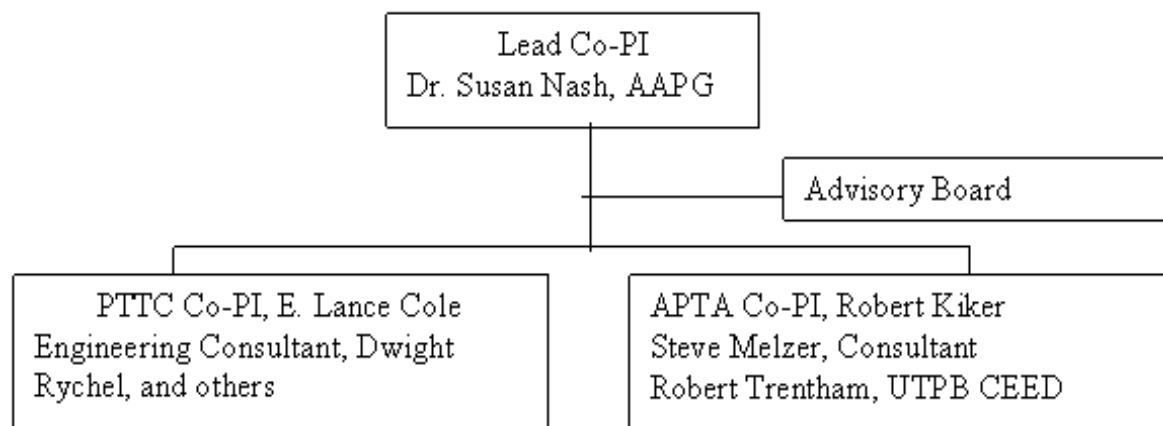
Other DOE Regional  
CCS Training Programs

DOE's regional Carbon  
Sequestration Partnerships

Seminal Publications &  
Reports

CCS-Related Links

## THE TEAM STRUCTURE AND RESPONSIBILITIES



PTTC	AAPG	APTA
Co-PI: E. Lance Cole	Lead Co-PI: Dr. Susan Nash	Co-PI: Robert Kiker
Consultant: Dwight Rychel		Steve Melzer, Consultant
		Robert Trentham, UTPB CEED

## INDUSTRY ADVISORY BOARD

Project effort is guided and directed by an Industry Advisory Board to ensure that developed products and training does provide participants with the skill sets needed to realize opportunities in CCS. Members representing the different industry sectors involved in CCS provide different fields of technical and business expertise. Beyond shaping the technical content of the training program, the Advisory Board will define the sponsorship and business model that will enable the CCS training program to progress towards self sufficiency beyond the period of this initial DOE grant.

Although volunteer spirit is one reason individuals are on the Advisory Board, they participate because of solid business benefits, which include:

- The program will ultimately provide a pool of trained CCS professionals available for employment.
- Links their companies directly to the wealth of CCS projects and personnel around the world.
- They themselves will come to better understand the CCS opportunities that may be there for themselves or their companies.

## ADVISORY BOARD MEMBERS

Name	Company	Phone
John Allison	Legado Resources	832.482.3907
Martin Cassidy	Consultant	713.503.8331
Paul Colwell	Whiting Petroleum	432.686.6769
Mike Honnert	Oxy	713.215.7473
Mark Holtz	Praxair	512.217.4833
Scott Ingram	Chevron	432.238.3479
Jeff James	Tenaska	817.303.3600
Gordon Moore	Denbury	972.673.2412
David Orchard	ConocoPhillips	832.486.2314
Ed Payne	Whiting Petroleum	432.943.5751
Dwight Peters	Schlumberger	281.340.8564
Rodney Reynolds	Kinder Morgan	432.688.3798
Mike Rushing	Apache	918.491.4805
Hoxie Smith	Midland College PPDC	432.683.2382
Mike Stell	Ryder Scott	713.751.5503



# Permian CCS Center

## Carbon Capture & Storage Technology

### Project Status

Award: DOE \$994,998      Matching: \$264,749      Total: \$1,259,747

Award Date: 11/16/09      End Date: 11/15/12

FY2010 Milestones Complete

- Advisory Board Formed

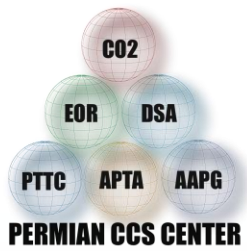
- Elements Defined

- Website Developed

- First Two Issues of Newsletter Delivered

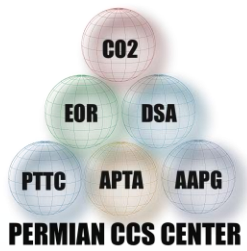
- Organized First Two Workshops

- Delivered First Two Webinars



# Permian Basin CCS Approach

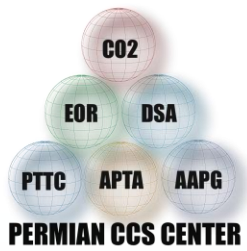
- **By and For Industry** - Industry organizations instructing Industry Professionals
- **Targeted audience** – wide range of energy professionals potentially involved in CCS, engineers, geoscientists, management, planners, landmen ([More about audience later](#))
- **Its all about the money:** for the individual to advance, for the project to be profitable, for PBCCS to become self supporting



# Major Elements of Permian Basin CCS

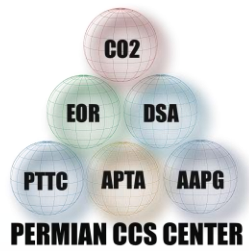
- Series of One-Day Workshops and Webinars (PTTC)
- Week-Long Short Course (APTA) – Industry Professionals instructing Industry Professionals
- E-Certificate (AAPG)
- Augmented by [www.permianbasinccs.org](http://www.permianbasinccs.org), Newsletter, e-alert





# Permian Basin CCS Workshops

- Overview of the Elements of CCS – CCS (and CO<sub>2</sub> Flooding in the Permian Basin)
- Site Selection and Operations – The Reservoir – Characterization, Modeling and Monitoring
- CO<sub>2</sub> Sources and Capture Technologies and Transportation
- CO<sub>2</sub> Flood Operations & Surface Facilities – Optimized CO<sub>2</sub> Flooding Operations
- Business of CO<sub>2</sub> Flooding and Moving Forward with CCS



# Permian Basin CCS

## Initial Webinar & Workshop Schedule

Webinar #1	Overview of Total CCS Process	Aug. 18 (very small audience)
Workshop #1	Overview of Total CCS Process (repeat of above)	Sep. 9, Midland (postponed) Sep. 10, Houston (postponed)
Webinar #2	CCS – The Reservoir	Sep. 1 (very small audience)
Workshop #2	CCS – The Reservoir	Sep. 29 (postponed)

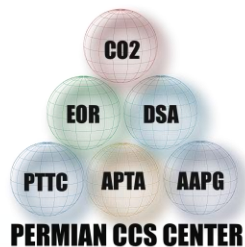
### **A CRITICAL CHALLENGE – CONNECTING WITH AN AUDIENCE THAT IS INTERESTED!**

Training products are evolving from a detailed outline for the extended length short course. There are five workshops planned – an initial “overview” of the total CCS process, followed by topical workshops. To help promote the workshops, each workshop is preceded by a webinar.



# Finding a Permian Basin CCS Audience?

- Initial Efforts (focused on O&G – commercial pricing)
  - >> “Invitation” subscription (PTTC, AAPG, APTA)
  - >> Primary promotion (e-alerts)
  - >> Secondary promotion (postcard to Texas – 5,000)
- Seeking a Different Audience (government, regulatory, environmental)
  - >> Cultivating/combining attendee lists from CCS-oriented meetings
  - >> Will take time to cultivate
  - >> APTA (Steve Melzer) – President, Texas Carbon Capture & Storage Assoc.
- Stronger focus on e-audience (90% of CCS is non-specific to Permian Basin – where they work, on their schedule, at low cost?)



[www.permianbasinccs.org](http://www.permianbasinccs.org)



## CARBON CAPTURE & STORAGE TECHNOLOGY

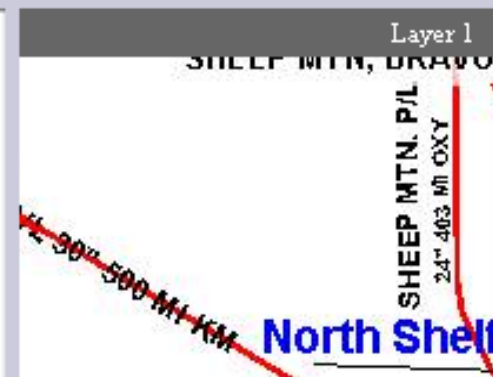
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Elements of the Program ▶  
 Calendar of CCS Events  
 Newsletter/Tech Alerts  
 CCS News of Interest ▶  
 Other DOE Regional  
 CCS Training Programs  
 DOE's regional Carbon  
 Sequestration Partnerships

### CCS-related layer maps of Permian Basin





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## CCS NEWS OF INTEREST - GENERAL

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[September 3, 2010 – Carbon Capture Journal RWE, BASF and Linde claim flue gas CO2 capture 'breakthrough'](#)

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[July 14, 2010 - DOE demonstrates viability of CO2 storage with EOR \(Carbon Capture Journal\)](#)

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[CO2-ECBM/Storage Activities at the San Juan Basin's Pump Canyon Test Site](#) (SPE, 2009, SPE Annual Technical Conference and Exhibition, 4-7 October 2009, New Orleans, Louisiana)

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[Scientists look to tracers to evaluate methods of pumping greenhouse gases underground](#) (Associated Press; June 14, 2010)

## SEMINAL PUBLICATIONS & REPORTS

[Modeling CO2 Storage in Aquifers: Assessing the Key Contributors to Uncertainty](#)

[CO2 Injection into Depleted Gas Reservoirs](#)

[Lessons Learned While Conducting Drilling and CO2 Injection Operations at the Victor J. Daniel Power Plant in Mississippi](#)

[DOE Sequestration Reference Shelf](#) – hundreds of reports, presentations, fact sheets, Best Practice Manuals and other references published by DOE

AAPG Memoir on CCS (currently in print production)

AAPG Studies in Geology #59: CO2 Sequestration: State of the Science

CCS Best Practices for MVA

[http://www.netl.doe.gov/technologies/carbon\\_seq/refshelf/MVA\\_Document.pdf](http://www.netl.doe.gov/technologies/carbon_seq/refshelf/MVA_Document.pdf)

CCS Best Practices Work for Public Outreach

[http://www.netl.doe.gov/publications/press/2010/10002-DOE\\_Publishes\\_Best\\_Practices\\_Manua.html](http://www.netl.doe.gov/publications/press/2010/10002-DOE_Publishes_Best_Practices_Manua.html)

[http://www.netl.doe.gov/technologies/carbon\\_seq/refshelf/BPM\\_PublicOutreach.pdf](http://www.netl.doe.gov/technologies/carbon_seq/refshelf/BPM_PublicOutreach.pdf)

Other CCS Regional Training Programs

[http://fossil.energy.gov/news/techlines/2009/09062-DOE\\_Awards\\_CCS\\_Training\\_Projects.html](http://fossil.energy.gov/news/techlines/2009/09062-DOE_Awards_CCS_Training_Projects.html)

DOE-Supported Partnership Projects “Development Phase” Projects Demonstrating CCS

[http://www.netl.doe.gov/technologies/carbon\\_seq/partnerships/development-phase.html](http://www.netl.doe.gov/technologies/carbon_seq/partnerships/development-phase.html)

IOGCC Work

<http://iogcc.publishpath.com/Websites/iogcc/pdfs/Road-to-a-Greener-Energy-Future.pdf>

<http://iogcc.publishpath.com/Websites/iogcc/PDFS/2008-CO2-Storage-Legal-and-Regulatory-Guide-for-States-Full-Report.pdf>





**Carbon Capture and Storage Technology**

# Catch & STORE

*World Class CCS Training for and by Industry Professionals*

[pttc.org](http://pttc.org) [aptapb.org](http://aptapb.org) [aapg.org](http://aapg.org)

[permianbasinccs.org](http://permianbasinccs.org)

VOLUME 1, NUMBER 2

AUGUST 2010

## RESIDUAL OIL ZONES

BY STEVE MELZER

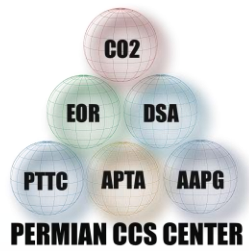
**O**ur first issue described pervasively dolomitized intervals (PDI) in the Permian Basin (PB). PDIs stem from a slow lateral invasion of water from outcrops on the western side of the PB that pervasively altered the limestone to dolomite resulting in a laterally continuous, moderately porous and permeable zone that provides a large potential sequestration sink. The lateral invasion of

## What does a Residual Oil Zone (ROZ) look like?

BY BOB TRENTAM, UTPB/CEED

**R**esearch is documenting the evidence for and characteristics of ROZs below the major San Andres reservoirs in the Permian Basin (PB). There is significant anecdotal evidence for the presence of ROZs from exploration wells in "goat pasture" both adjacent to, and at distance

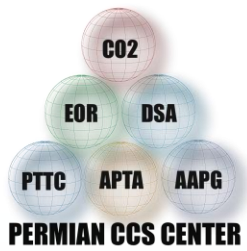
Characteristics. Rock properties include: the presence of sulfur crystals associated with gypsum in the swept interval (ROZ) of carbonate reservoirs; evaporites that are dissolved in the ROZ or altered in the lower part of the main pay; sample shows of oil and/or gas (odor, cut, fluorescence in samples, and mud logs); massive "late"



# Permian Basin CCS e-Cert Program

- Online program
- Proceed at your own pace
- Certification after demonstrated learning
- Similar topics as short courses
- AAPG tested the water with a free, entry-level open shortcourse

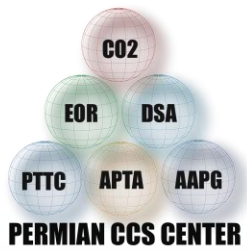




# Permian Basin CCS Training Center

## What Has Worked

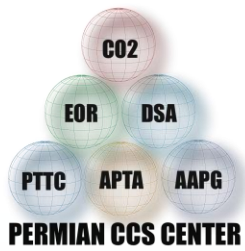
- Highly Qualified and Responsive Advisory Board
- Newsletter and e-Alert Informative, hundreds of readers
- Broad Encompassing Curriculum
- Structure in place for first two short Courses and Webinars



# Permian Basin CCS Training Center

## What Hasn't Worked

- Lack of congressional action regarding climate control providing incentives to capture and sequester CO2 causing otherwise interested parties to lose interest
- Targeted Oil and Gas Professionals in Permian Basin have skills in place for sequestration via CO2 EOR and little interest in geological storage in saline formations
- Consequently low interest in early produced workshops and webinars

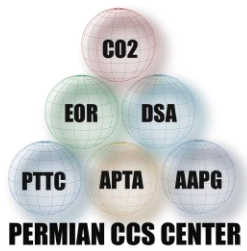


# Permian Basin CCS Training Center

## Going Forward

(Discussions w DOE re SOPO changes)

- Continue to broaden the regulatory, environmentalist, scientific audience (while keeping O&G audience)
- Conduct “essentially free” “lunch and learn” meetings (in Texas & elsewhere) – confirm an audience can be found, learn how they want knowledge delivered, and at what cost
- Develop a lower cost “mid-level” AAPG e-certificate (as opposed to initially planned “in depth” content)
- Continue to develop content for planned workshops (knowledge captured once audience is found)



# Permian Basin CCS Training Center

## Questions?

Lance Cole

Petroleum Technology Transfer Council

[lc@pttc.org](mailto:lc@pttc.org)

(918-241-5801)